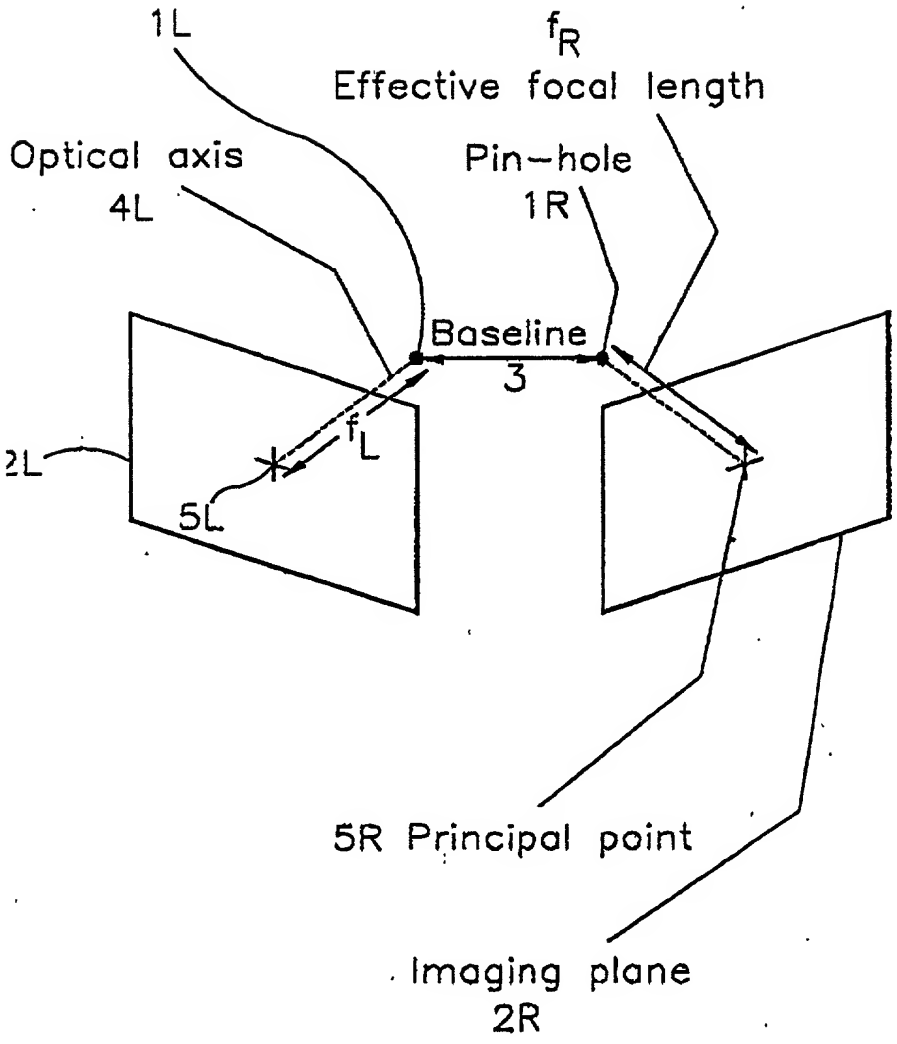

1L
f_R
Effective focal length
Optical axis
4L
Pin-hole
1R
Baseline
3
f_L
2L
5L
5R Principal point
Imaging plane
2R

FIG 1

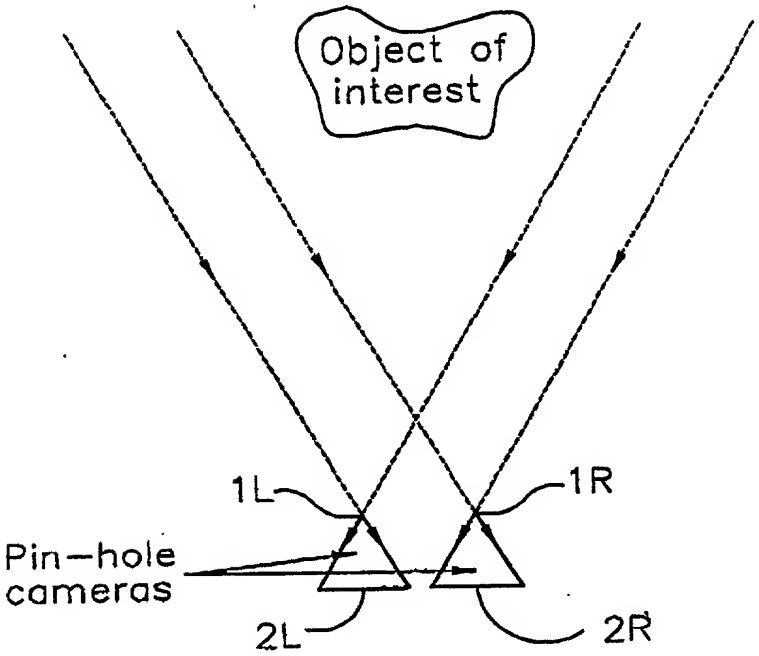
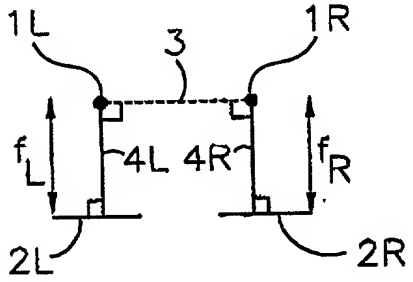


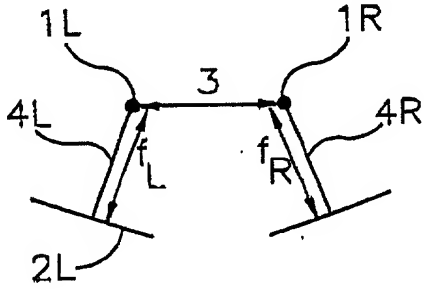
FIG 2 (a)



$f_L = f_R$

FIG 2 (b)

$f_L \neq f_R$



$f_L \neq f_R$

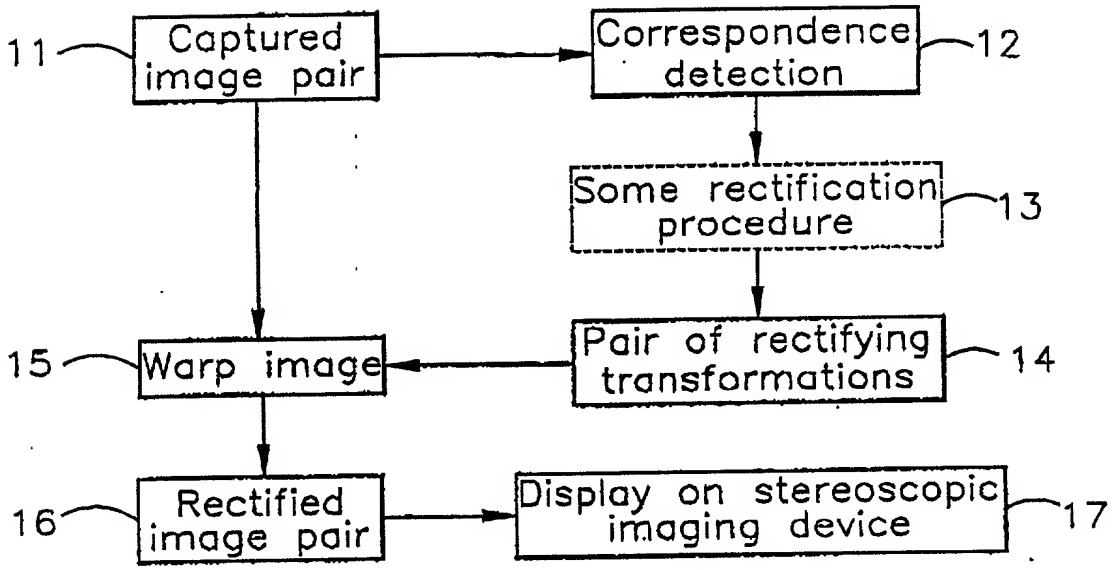
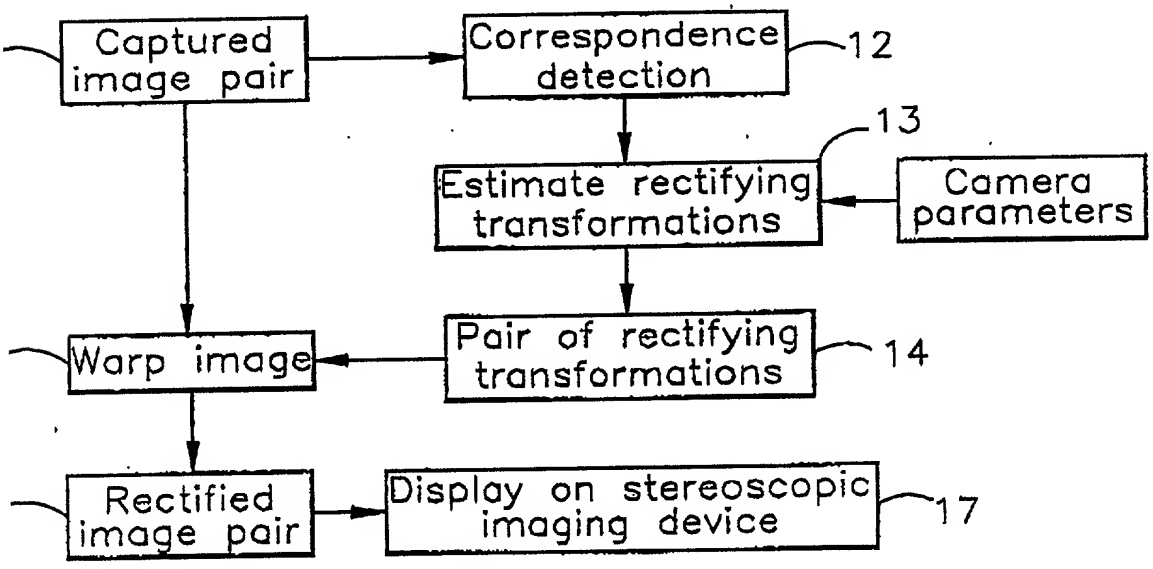

11
Captured image pair
Correspondence detection
12
Some rectification procedure
13
15
Warp image
Pair of rectifying transformations
14
16
Rectified image pair
Display on stereoscopic imaging device
17

FIG 3 (a)


Captured image pair
Correspondence detection
12
13
Estimate rectifying transformations
Camera parameters
Warp image
Pair of rectifying transformations
14
Rectified image pair
Display on stereoscopic imaging device
17

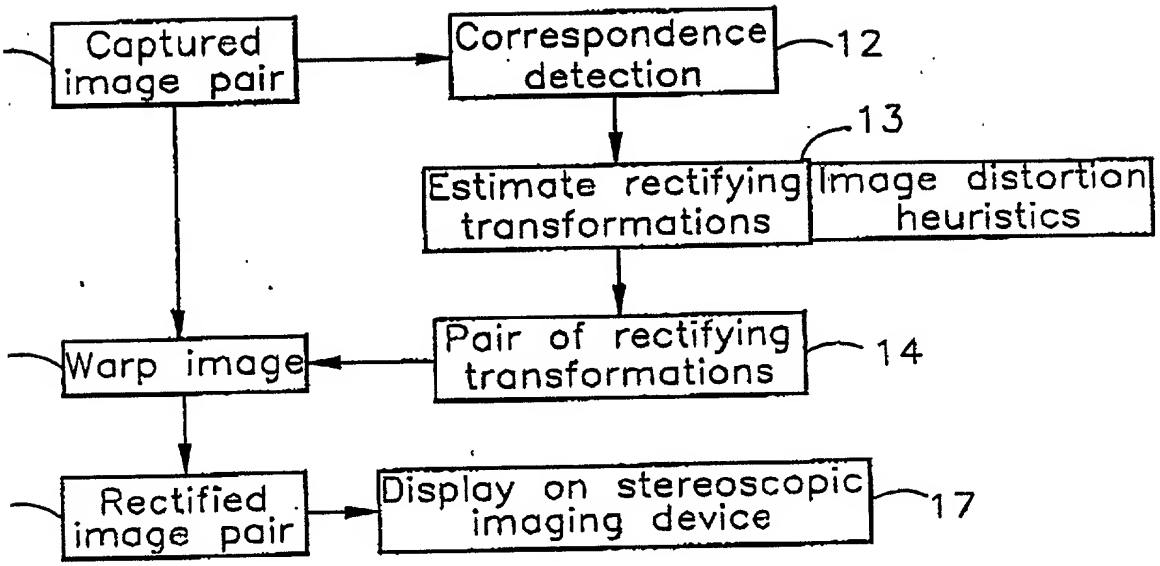

Captured image pair
Correspondence detection
12
13
Estimate rectifying transformations
Image distortion heuristics
Pair of rectifying transformations
14
Warp image
Rectified image pair
Display on stereoscopic imaging device
17

FIG 3 (c)

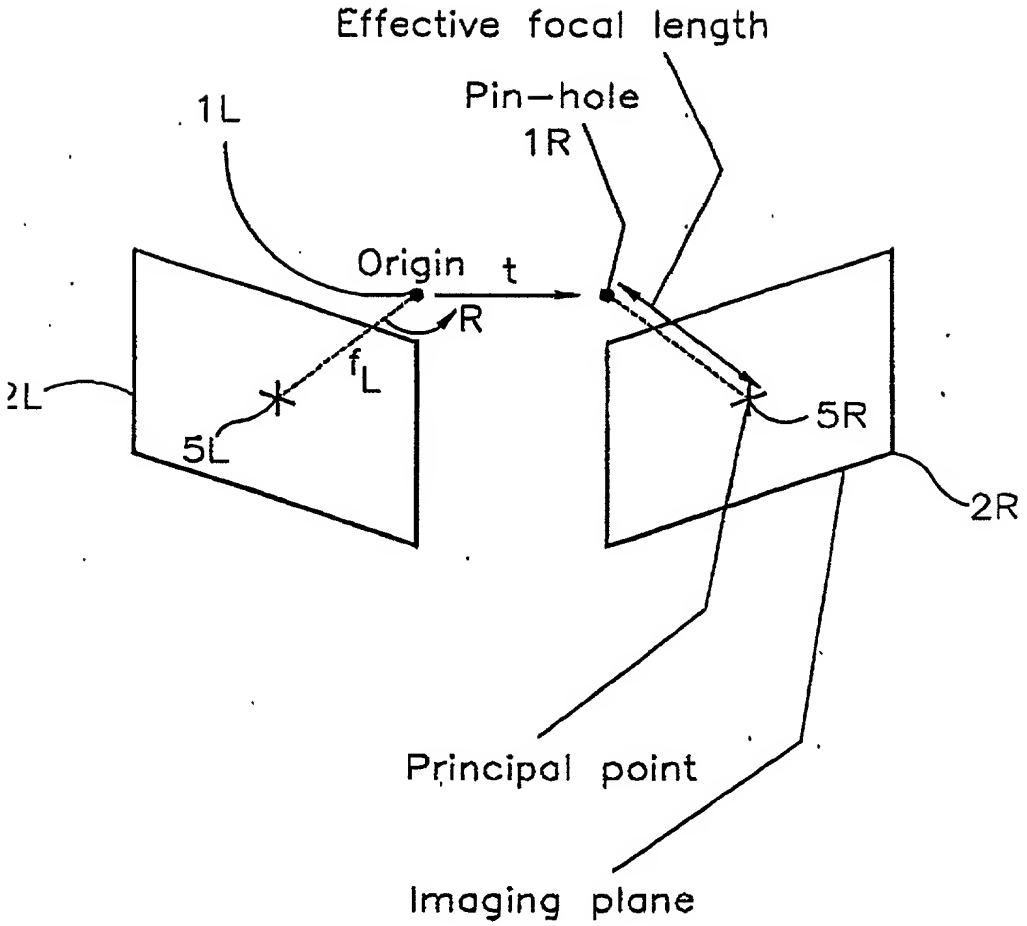

Effective focal length
Pin-hole
1L
1R
Origin
t
R
f_L
2L
5L
5R
2R
Principal point
Imaging plane

FIG 4(a)

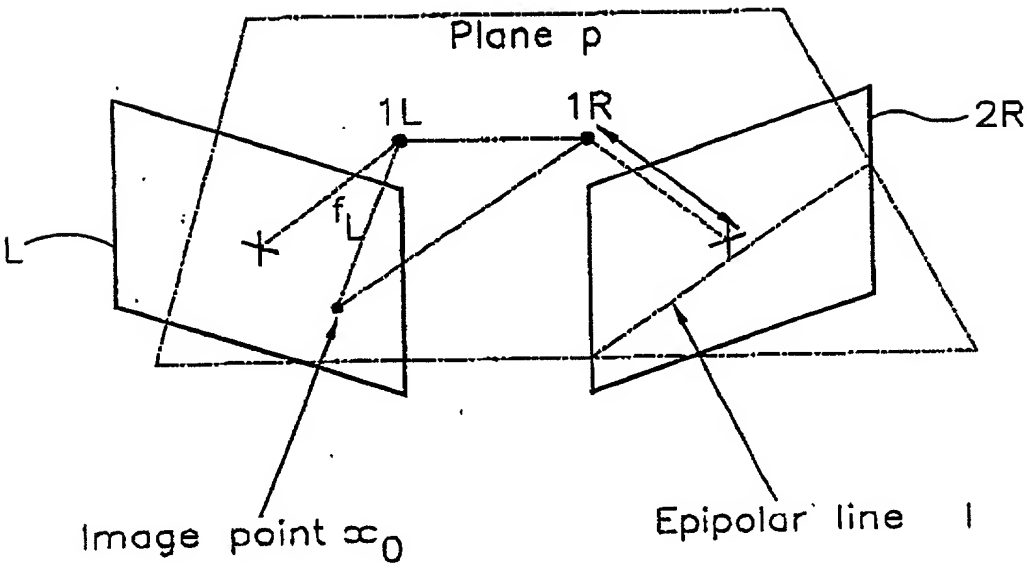
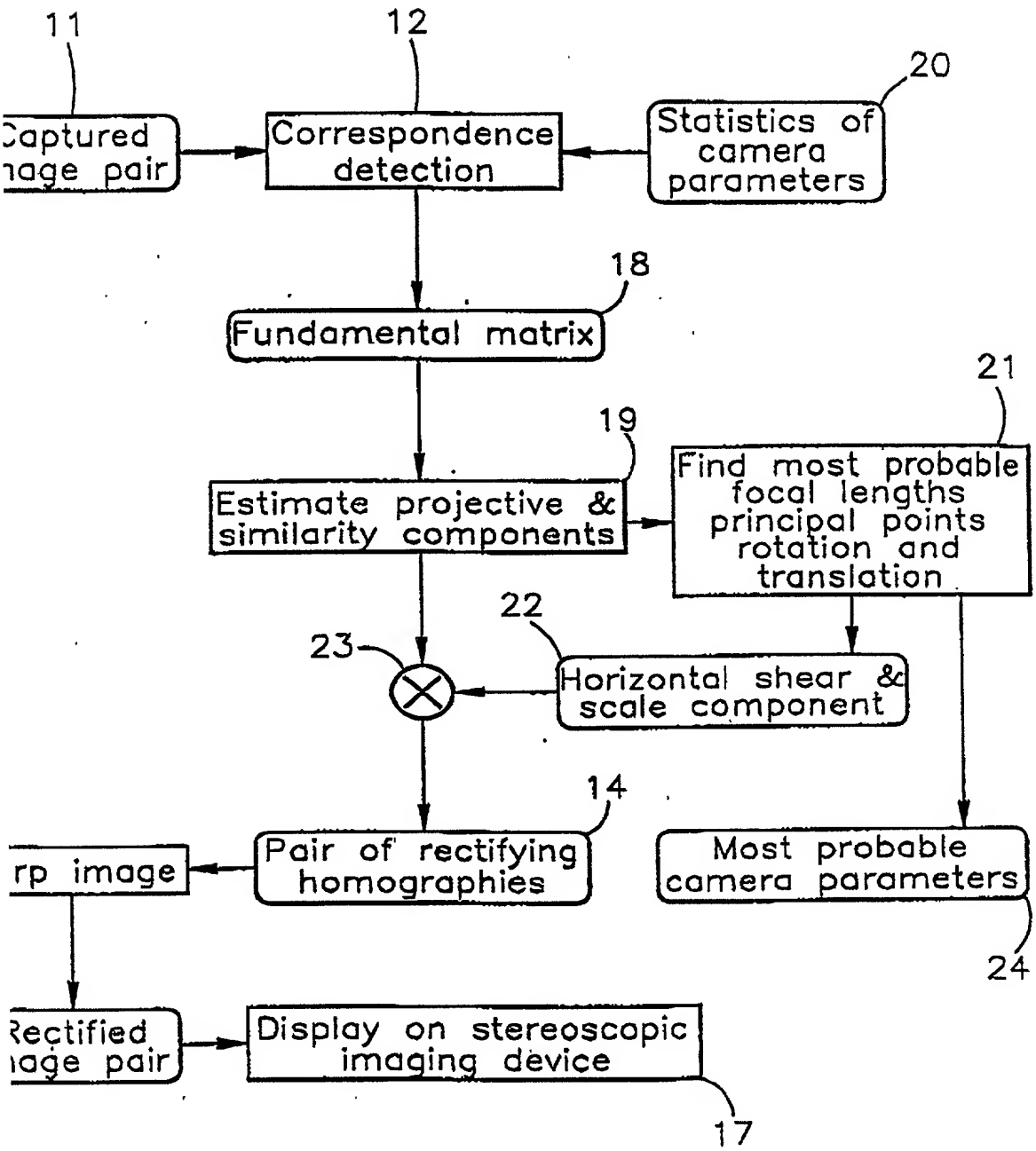


FIG 4(b)


11
12
20
Captured image pair
Correspondence detection
Statistics of camera parameters
18
Fundamental matrix
21
19
Estimate projective & similarity components
Find most probable focal lengths principal points rotation and translation
22
23
Horizontal shear & scale component
14
rp image
Pair of rectifying homographies
Most probable camera parameters
24
Rectified image pair
Display on stereoscopic imaging device
17

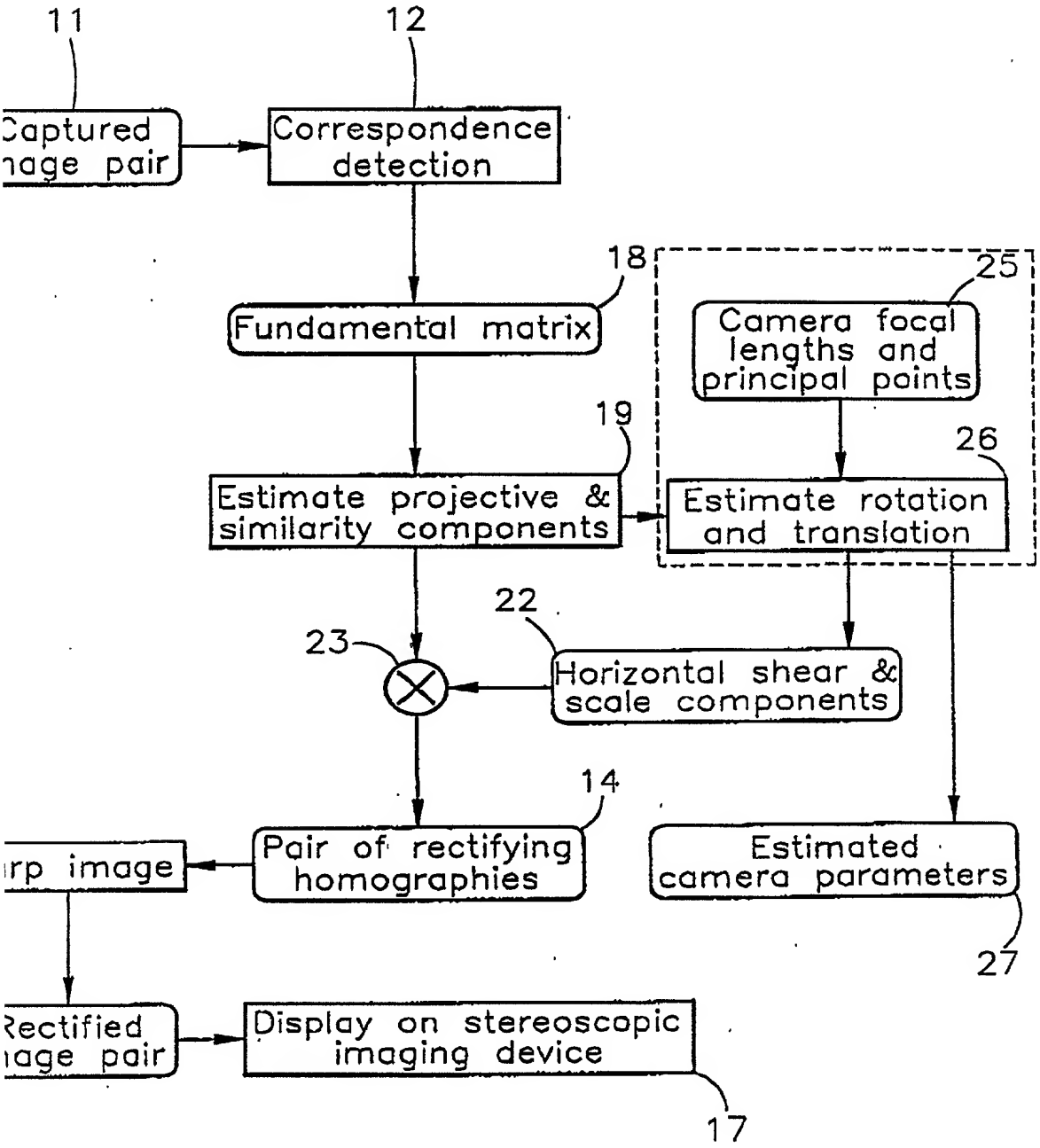

11
12
Captured image pair
Correspondence detection
18
Fundamental matrix
25
Camera focal lengths and principal points
19
26
Estimate projective & similarity components
Estimate rotation and translation
22
23
Horizontal shear & scale components
14
Pair of rectifying homographies
rp image
Estimated camera parameters
27
Rectified image pair
Display on stereoscopic imaging device
17

FIG. 6

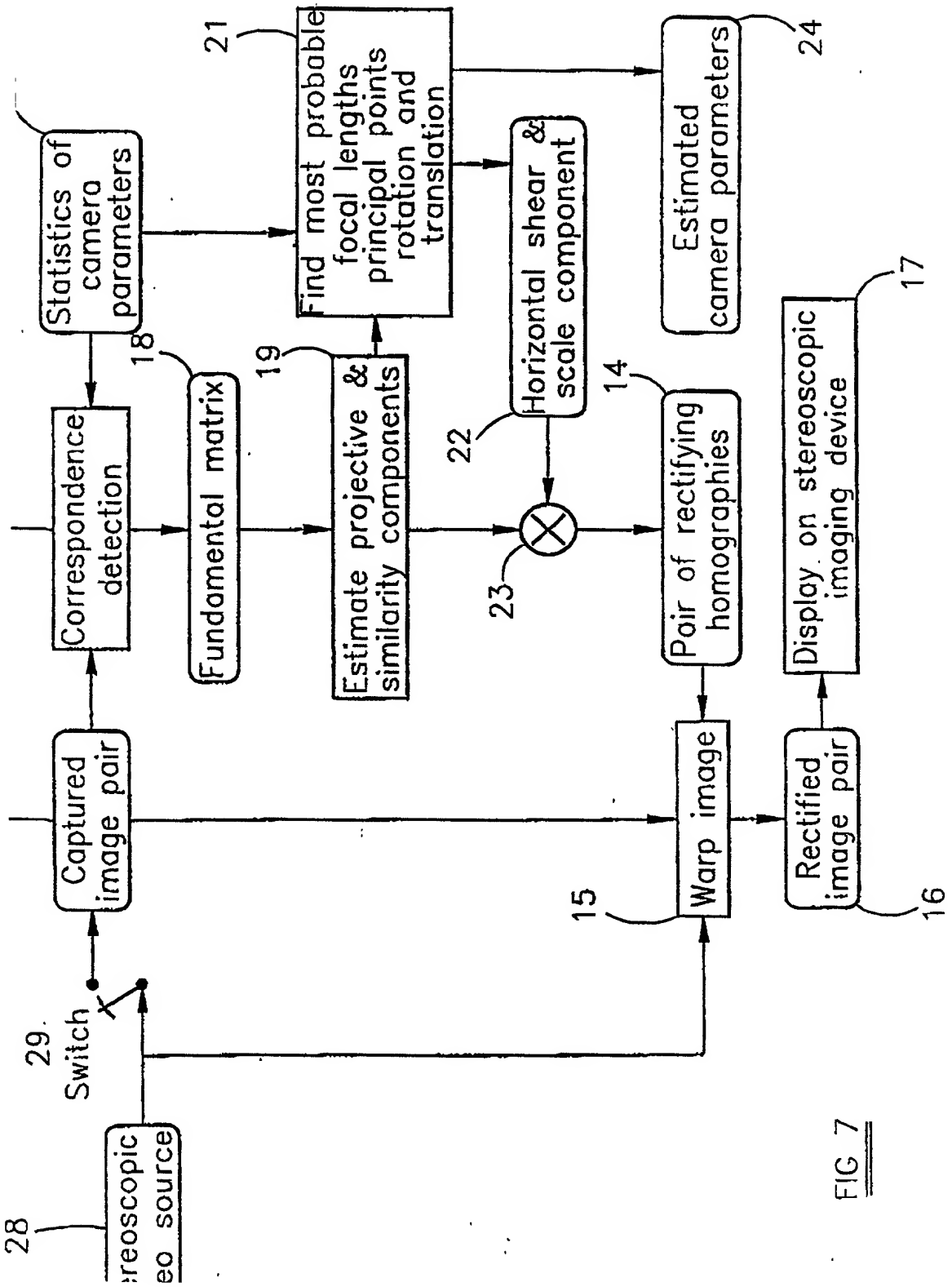
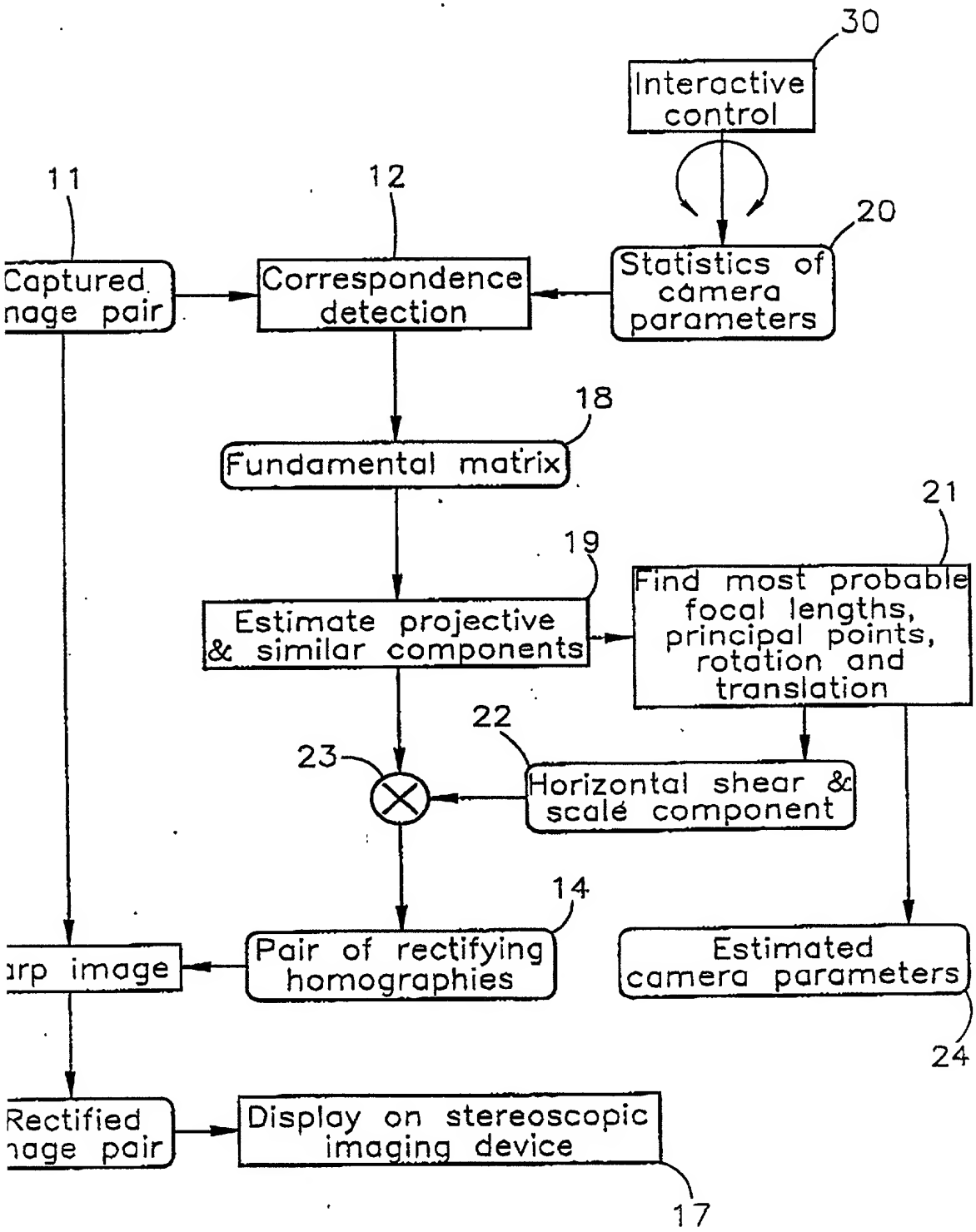

28
Stereoscopic video source
29
Switch
Captured image pair
Correspondence detection
18
Fundamental matrix
19
Estimate projective & similarity components
21
Find most probable focal lengths principal points rotation and translation
Statistics of camera parameters
22
Horizontal shear & scale component
23
14
Pair of rectifying homographies
24
Estimated camera parameters
15
Warp image
Rectified image pair
16
Display on stereoscopic imaging device
17

FIG 7


30
Interactive control
11
12
20
Captured nage pair
Correspondence detection
Statistics of camera parameters
18
Fundamental matrix
21
19
Find most probable focal lengths, principal points, rotation and translation
Estimate projective & similar components
22
23
Horizontal shear & scale component
14
arp image
Pair of rectifying homographies
Estimated camera parameters
24
Rectified nage pair
Display on stereoscopic imaging device
17

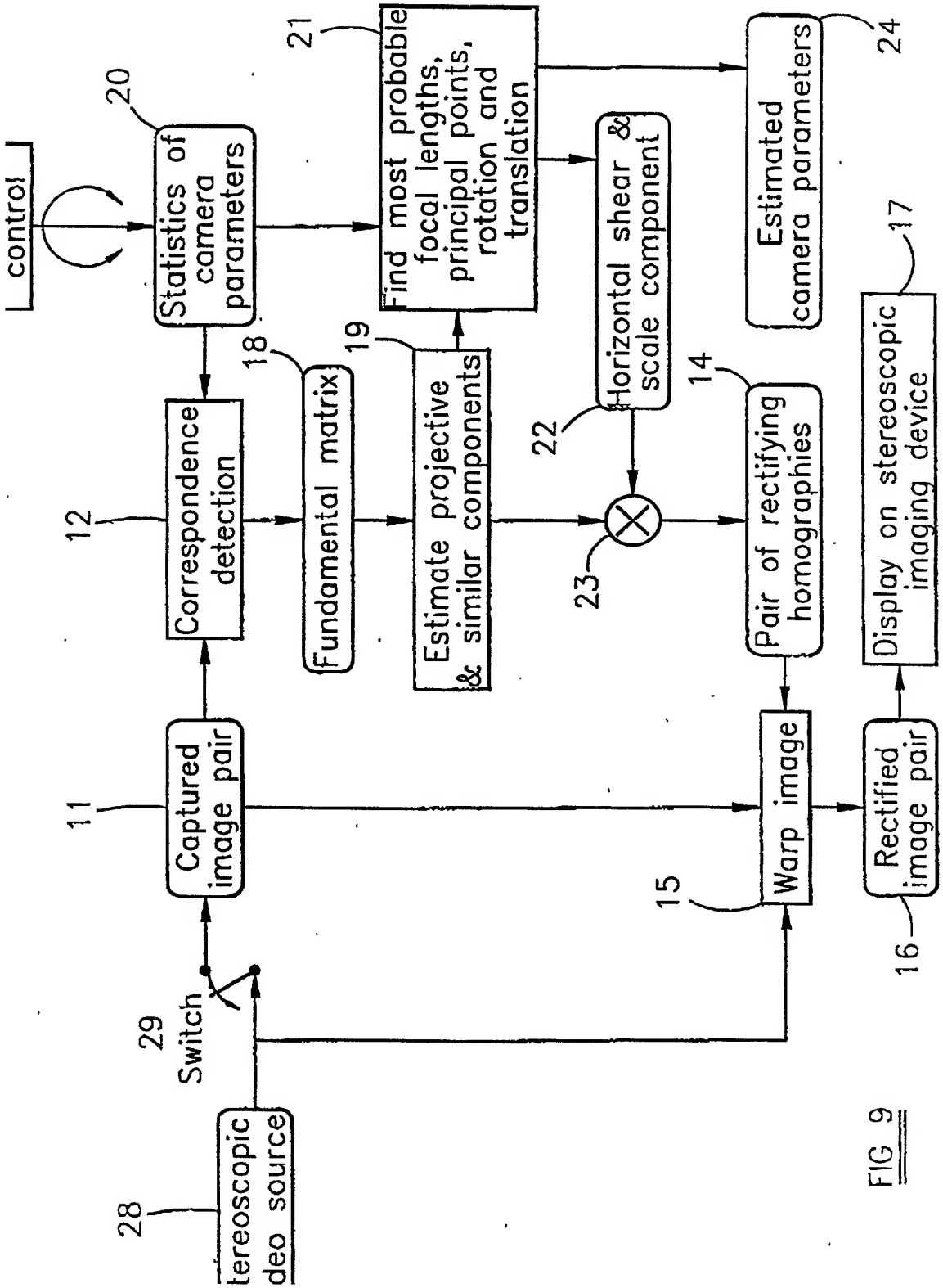

control
Statistics of camera parameters
20
Find most probable focal lengths, principal points, rotation and translation
21
Estimated camera parameters
24
Correspondence detection
12
Fundamental matrix
18
Estimate projective & similar components
19
Horizontal shear & scale component
22
23
Pair of rectifying homographies
14
Display on stereoscopic imaging device
17
Captured image pair
11
Warp image
15
Rectified image pair
16
29
Switch
Stereoscopic video source
28

FIG 9

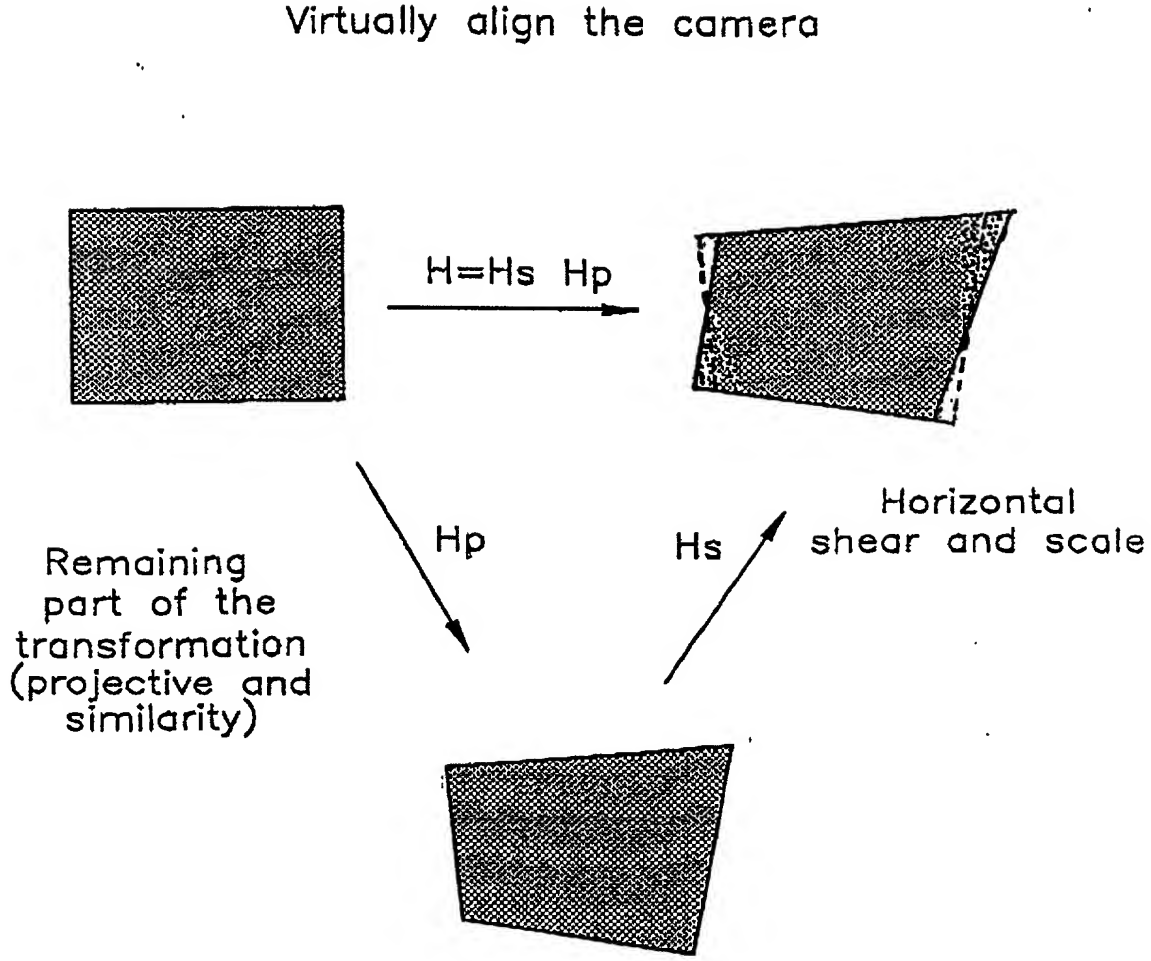
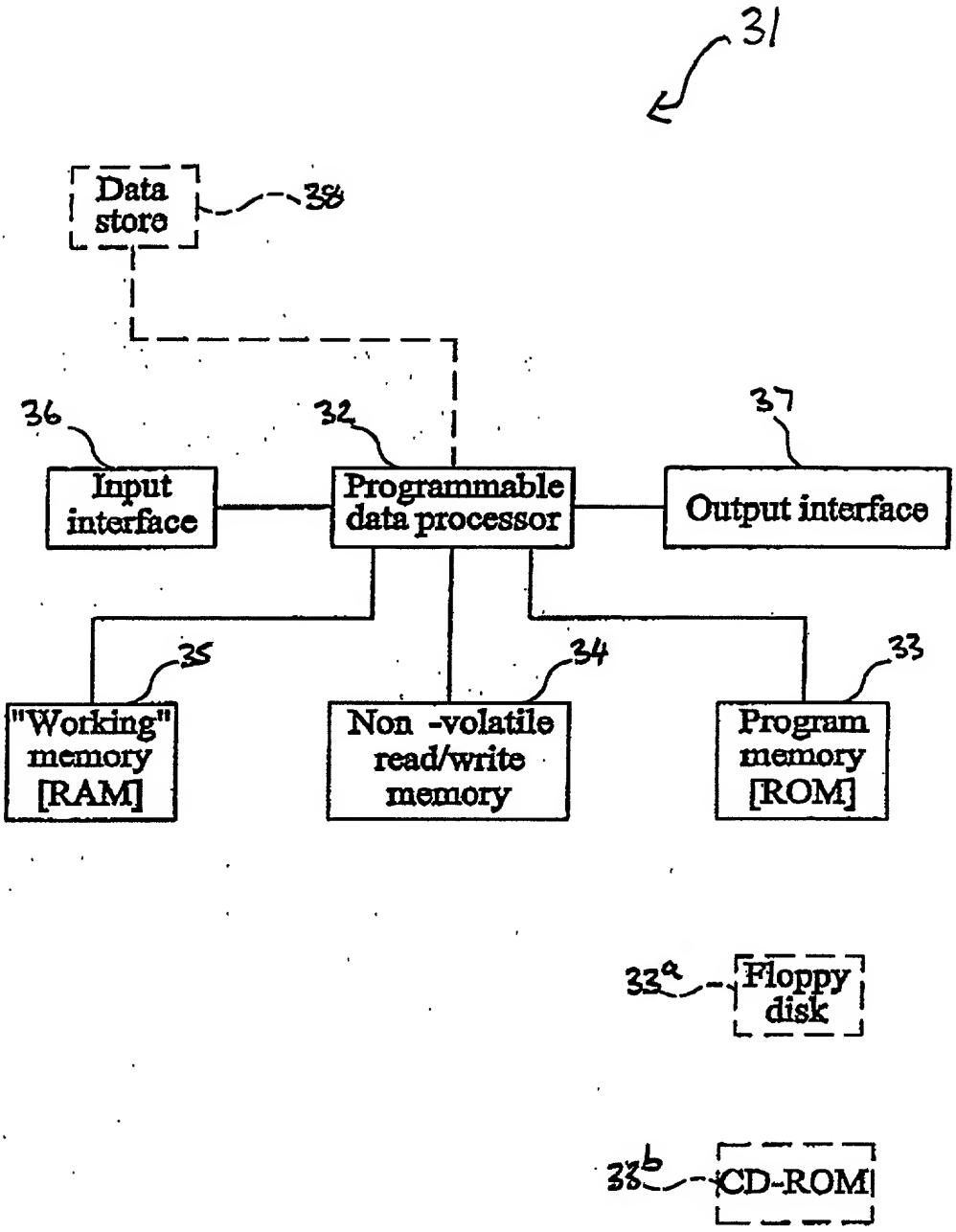

Virtually align the camera
H=Hs Hp
Hp
Hs
Horizontal shear and scale
Remaining part of the transformation (projective and similarity)

FIG 10


31
Data store
38
36
32
37
Input interface
Programmable data processor
Output interface
35
34
33
"Working" memory [RAM]
Non -volatile read/write memory
Program memory [ROM]
33a
Floppy disk
33b
CD-ROM